MEMORANDUM TO: Joseph A. Murphy, Chairman
Committee to Review Generic Requirements

FROM: Jon R. Johnson, Deputy Director
Office of Nuclear Reactor Regulation

SUBJECT: REQUEST FOR REVIEW AND ENDORSEMENT OF A FINAL RULE: "REVISION OF THE SKIN DOSE LIMIT," 10 CFR PART 20

Attached for CRGR review and endorsement is a Commission paper and supporting documents for the subject final rule. This final rule accomplishes the following:

– Changes the definition and method of calculating Shallow-dose equivalent (SDE) by specifying that the assigned SDE must be the dose averaged over the 10 square centimeters of skin receiving the highest exposure, rather than 1 square centimeter as currently required.

– Makes the skin dose limit less restrictive when small areas of skin (< 1 square centimeter) are irradiated.

– Addresses skin doses from all sources and source geometries (including "hot particles") under a single limit.

– Trades a higher risk of transient, deterministic effects to the skin, for a reduction in the risks of stochastic effects from whole-body dose incurred in monitoring for hot particles.

– Reduces unnecessary regulatory burden on licensees for reporting small area skin doses that have insignificant health implications.

– Reduces unnecessary whole-body doses and non-radiological health risks such as heat stress to workers.

– Incorporates recommendations of the National Council on Radiation Protection and Measurements (NCRP) into the regulations.

The attached Commission paper includes copies of the public comment letters under a Background tab. All of the public comments supported the proposed rule. Section II of the Federal Register notice provides a discussion of public comments.

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A CRGR Charter Review Package is attached that addressees the issue of exception from backfit based on redefinition of adequate protection. A final Regulatory Analyses is Attachment 3 of the Commission paper.

Attachments
1. CRGR Charter Review Package
2. Commission paper

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CRGR CHARTER REVIEW PACKAGE

This discussion responds to paragraph (IX) of section B of the Revised Charter for the Committee to Review Generic Requirements (CRGR). This discussion is limited to this paragraph because a Regulatory Analysis is provided in the Commission paper and because the staff decided with OGC concurrence that this rulemaking constitutes a redefinition of adequate protection and is thus excepted from the requirement to perform a backfit analysis pursuant to 10 CFR 50.109(a)(4).

IV.B.(IX)(a)(I). Objectives of the Modification

This final amendment of 10 CFR Part 20, "Revision of the Skin Dose Limit," is intended to meet the following objectives:

a. Significantly reduces the whole-body dose and associated stochastic risk incurred from monitoring for "hot particle" contaminations that might exceed the current skin dose limit of 50 rem (0.5 Sv) averaged over 1 square centimeter.

b. Changes the definition and method of calculating Shallow-dose equivalent (SDE) by specifying that the assigned SDE be the dose averaged over the 10 square centimeters of skin receiving the highest exposure, rather than 1 square centimeter as currently required.

c. Makes the skin dose limit less restrictive when small areas of skin (< 1 square centimeter) are irradiated.

d. Addresses skin doses from all sources and source geometries (including "hot particles") under a single limit.

e. Trades a higher risk of transient, deterministic effects to the skin, for a reduction in the risks of stochastic effects from whole-body dose incurred in monitoring for hot particles.

f. Reduces unnecessary regulatory burden on licensees for reporting small area skin doses that have insignificant health implications.

g. Workers who receive a skin dose greater than 50 Rem (0.5 Sv) to 1 square centimeter, an insignificant dose, will not be prohibited from working in radiation areas for the balance of the record year.

h. Reduces unnecessary whole-body doses and non-radiological health risks such as heat stress to workers.

i. Incorporates recommendations of the National Council on Radiation Protection and Measurements (NCRP) into the regulations.

IV.B.(IX)(a)(2) Reasons for the Modifications

Installation of highly sensitive portal monitors at NPPs in the mid 1980s made it apparent that some plants had large numbers of small, discrete radioactive particles (DRPs), also called "hot particles." These DRPs occasionally adhered to the skin and clothing of workers and could

deliver doses to very small areas of the skin that exceeded the existing 50 Rem (0.5 Sv) over 1 square centimeter dose limit. Small area, non-uniform skin doses are also found at some materials licensees, such as irradiator source and radiopharmacetical manufacturers.

These small-area doses were found by research studies performed at Brookhaven National Laboratory for the NRC, and at Texas A&M for EPRI, to cause at worst, transient reddening or transient breaks in the skin. The NCRP published two reports (NCRP-106 and NCRP-130) based on these, and other studies, and stated that, "If effects from a hot-particle exposure are observed, the result is an easily treated medical condition involving an extraordinarily small stochastic risk. Such occurrences ... should not be compared in seriousness to exceeding whole-body exposure limits."

In order to avoid exceeding the 50 Rem (0.5 Sv) to 1 square centimeter skin dose limit, licensees monitor workers frequently for the presence of DRP contamination, thus causing additional, and unnecessary whole-body dose. In order to prevent DRP contamination, licensees also issue overly-conservative protective equipment such as plastic suits and gloves that expose workers to non-radiological hazards such as heat-stress and increased accident potential.

This rule change, by requiring that these small area (< 1 square centimeter) doses be averaged over 10 square centimeters, is in effect a factor of 10 reduction of the skin dose limit for small areas. Licensees will not need to monitor as frequently for DRP contaminations, and excessive protective equipment can be avoided. The rule change significantly reduces unnecessary whole-body monitoring dose and non-radiological hazards, at the cost of possibly more frequent transient, but less damaging deterministic effects.

This change is consistent with the Technology Transfer and Advancement Act of 1995, in that it endorses NCRP recommendations, and is consistent with regulations of the Department of Energy.

IV.B.(IX)(a)(4) Basis for Invoking Exception for Redefining Adequate Protection

The nuclear industry has reported that from 1 to 5 person-rems of additional external whole-body dose per NPP outage can be attributed to monitoring for DRP contamination. This dose and its associated stochastic health risk is the result of complying with the current skin dose limit that is described by the NCRP as overly conservative, especially for small area exposures. The revised skin dose limit redefines worker protection by basing the limit on the relative risk of small area skin doses compared to the whole-body doses and non-radiological hazards incurred to avoid the skin doses.

Section XI. Backfit Analysis, in the Federal Register notice provides the justification for invoking an exception to performing a backfit analysis based on a redefinition of adequate protection.

IV.B.(IX)(a)&(b) Evaluation of Relaxation of Current Burden

Attachment 3 Regulatory Analysis, of the attached Commission paper, addressees the issue of burden reduction and concludes that when all costs and benefits are evaluated, this rule is estimated to save the nuclear industry about 670 thousand dollars per year.